INTERACTION OF MILITARY GEOGRAPHY, METEOROLOGY AND MILITARY ART BASED ON THE EXAMPLE OF WAR EVENTS

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Abstract
Examining the relationship between geography, geospatial information, and military activities is not a new idea, it has been part of military art since ancient times. Methods have changed, the role of knowledge of space has not diminished over the centuries, it has only changed. Throughout history, there have been several wars and battles in which the battlefield itself has played an important role. Knowledge, or lack of knowledge of weather elements, terrain, geographical features decisively influenced the outcome of events, therefore combat events and military science mutually shaped each other. In this paper, I will present the evolution, development of this interaction and the necessary change in the study with some developed historical examples.

Keywords:
military art, military geography, meteorology, terrain, battles.

INTRODUCTION

Security geography is a new concept, but the impact of geography on military activities is not a new idea, it is only examined differently today. The role of knowledge of space has not diminished over the centuries, it has only been transformed. In the period of empiricism, they started from the empirical fact that there is a close connection between military activities and the natural environment. [1] There have always been impartial, military-geographical factors in the fight, which can be measured, mapped and used for a specific purpose, or formed into a subjective factor that we can turn to our own advantage. It has always been clear that military geographical factors in fighting can be turned to our own advantage. This idea has been raised for more than two thousand years in Sun Tzu's work, the "Art of War", where we first meet scientifically valuable definitions of military geography. [2] Throughout history, there have been many battles and wars in which the field has played an important role. The terrain, the geographical features, the knowledge of these can decisively influence the outcome of the combat events.

The emergence of large armies has not only led to the expansion of the battlefield, the time spent on the battlefield also increased. In order to the army should be able to settle these longer battles and not suffer a shortage of supplies, an even more comprehensive knowledge of the terrain was needed. From the middle of the 19th century, in addition to terrestrial surveys, aerial surveys also appeared.

Nowadays, common terminology, geoinformation, is more than a map representation or a study of terrain, examining static and dynamic information about the Earth's surface, atmosphere, and waters, and the effect of terrain and weather on combat activity within a given crisis area. [3]

1 THE ROLE OF THE TERRAIN IN BATTLE

In his work, Sun Tzu mentions the importance of seasons, times of the day, and terrain – these are still valid foundations. In the Hungarian Defence Forces, the Geoinformation Service was established in 2007 by merging the Cartographic Service of the Hungarian Defence Forces and the Meteorological Service of the Hungarian Defence Forces, connecting the "terrain" with the "seasons" so establishing the unity of "static" and "dynamic" data. That time they analysed mainly the terrain itself, so among the military geographical factors. [4] These are the forerunners of today's meteorological support ideas, the first military science thoughts to signal the importance of weather. Meteorology is an essential part of modern geospatial information support today.

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The experience of military geography is also reflected in the works of the founder of the Hungarian military science, Miklós Zrínyi. In Chapter 13 of his work "Vitéz hadnagy" ("Gallant Lieutenant") from the 1650s he wrote about the knowledge of land and terrain. [5] He realized that knowledge of the terrain was essential for successful combat, and Zrínyi not only described, but also knew and took advantage of the terrain. [6]

In the next chapters I will present some specific examples where military events were decisively influenced by knowledge of the terrain, or, from the other side, a lack of knowledge. There are also those where one of the fighting parties has directly reshaped the terrain, there are places where the opportunities provided by the terrain have been taken advantage of, and there are places where they have attacked only after special targeted preparation, knowing the special terrain conditions.

1.1 331 BC, GAUGAMELA

In the first case, we see an attempt to shape the terrain for battle. In 331 BC, inside the Persian Empire, near Gaugamela – close to the modern city of Duhok, Iraq – Alexander the Great's 46,000-strong Macedonian army collided with Darius III, the Persian Great King with an army of about 90,000. Alexander the Great triumphed over superiority in one of the greatest battles in the history of antiquity, partly because having explored the terrain in Darius' supremacy.

Alexander the Great's army was mixed, but consisted mostly of well-trained and disciplined soldiers. The base consisted of a phalanx infantry armed with long spears and light but secure shields. The cavalry consisted mainly of Macedonian and Greek nobles, but was not of such importance. By comparison, the Persian cavalry was the main force deciding the battle, which rushed fiercely, but had no other function, and this was a disadvantage. In addition to assault, Alexander's cavalry also performed other tasks, such as securing the sides of the army and reconnaissance of the terrain.

Darius was aware that there would probably be a fateful clash between the forces of the two empires, so he tried to make all the important preparations. Since the territorial conditions did not give Alexander an alternative, Darius could even have prepared the terrain: he leveled the area to make it optimal for his war chariots. It was a very new scientific approach that he not only adapted to the conditions of the terrain and took advantage of them, but also tried to shape them to his own advantage. Before the battle, Alexander thoroughly assessed the circumstances and concluded that it was impossible to prevent the Persian siege. In order to this should happen, he placed a second phalanx behind the Macedonian phalanx in the middle of his order in advance, ready to fight the enclosures.

Due to the terrain, a huge cloud of dust attacked right at the beginning of the battle, through which it was difficult to follow the movements, but communication between the individual units and the leaders also caused problems. The forged Macedonian army was able to take an advantage of it as well. Alexander the Great placed the center of his attack on the right wing, forcing the Persians to use their chariots even where the terrain was no longer leveled. They were decimated with spears and arrows, then the rows of phalanx parted, those war chariots went through the slits were then fought one by one. With this, Darius lost one of his main advantages: the chariots that attacked too early were not followed in time by the cavalry, so he could not break into the gaps in the phalanx.

In a fierce clash on the Persian left wing, Darius' cavalry began to sway. To help them, the commander-in-chief sent riders from the middle, weakening his forces there. Alexander immediately seized the opportunity: he personally led the attack on the Persian Middle, where Darius was also present. The Persian waistline retreated, and by this time their left wing had also lost the fight, so the battle ended with the victory of Alexander the Great, and Darius fled. [7]

1.2 1513, FLODDEN

The English crossed the Channel in 1513 and attacked France. Scottish monarch James IV, being in alliance with the French, launched an attack on the English in order to divide the English armies,

opening a second front in the north of England. Departing from Edinburgh, the Scottish army pushed towards the English frontier, then camped on the highlands of Flodden and set up for defense. They dug firing positions for their cannons, setting up defensive positions on the uneven surface. However, the defensive position of the camp was inadequate, as it provided a relatively large view of the terrain in front of it, but the uneven, hilly surface of the area favored the arriving Englishmen. Seeing the passivity of the Scots, the English troops led by Thomas Howard, who having had good knowledge of the terrain, unobtrusively bypassed the Scottish camp, cutting off a larger Scottish army from their only escape route who did not have adequate field knowledge and were thus at a technical disadvantage. The English maneuver in the hills was not seen by the camping Scottish troops, who were surprised by the Englishmen appearing behind them. The Scots, forced to give up their defensive positions, marched to the opposite Branxton hill. On September 9, the armies fought each other. The English, although at a disadvantage in terms of numbers, won over the Scots. Several sources put the number of Scottish dead at ten thousand, while the English lost about one thousand five hundred people on the battlefield, although James IV also died in the battle. Elevations – believed to be safe defensive positions – proved to be crucial in difficult-to-see, foreign terrain. [8]

1.3 1917, OCCUPYING MAGYAROS PEAK

At the end of the section on the role of the terrain, I examine a case where the difficulties of the terrain were eliminated by thorough exploration and practice on another terrain suitable for battlefield modeling. It was the occupation Magyaros Peak in 1917.

Romania entered WW1 on August 27, 1916, on the side of the Triple Entente, with the specific aim of occupying Hungary and isolating the Balkan battlefield. Central Powers therefore set the goal of stopping the Romanian attack and then, after the cleansing of Transylvania, carrying out offensive military operations that resulted in a relatively short front line against Russian-Romanian forces. The 39th infantry division of the Hungarian army was still able to achieve a very spectacular and important success. At the end of 1916, the division was chasing the Romanian troops, which had infiltrated the country, through Csík county in the valley of the stream Úz and reached the Eastern borders of Hungary. As the Romanian army had already established positions along the banks of the stream, the Hungarian and German division needed to stop there. [9]

In the middle of November, the Romanian forces were replaced by Russian troops of significantly superior number, and they almost immediately went on the attack along the entire line. As a result, in December they captured the peaks, the possession of which could have meant great advantages for the entire front line. The German divisions refused to attempt to recapture the peaks, but assigned the 39th infantry division of the Hungarian army, who planned a surprise attack.

The valley of Úz is bordered by pine forests and steep cliffs. The most significant heights of the Csíki Mountains are 1300-1600 meters. These mountain ranges made it possible to build a coherent protection system of approximately four kilometers. The steep hillsides made the movements even for the infantry very difficult while impossible for any other military branches. The deployment and activities of the troops were made extremely difficult also by the fact that the area was of untouched nature and that the nearest inhabited settlement lied about 30 kilometers away. In addition it was winter, and by the end of February the landscape was covered with more than half a meter of snow.

The planning of the attack was based on the experience gained during previous attacks. The preparations, the practice of the terrain, were carried out in a specially designated place, which was designed similarly to the original site, and copies of the Russian positions were made on the basis of aerial photographs. Preparation and practice were planned for ten days, but extended by five more days. [10] On-site preparatory work was made extremely difficult by the deep-frozen soil and the occasional eighty-centimeter-high snow and the cold of minus thirty degrees. First, coverings were made for the technical teams, and then the passageways were widened to two feet wide, where necessary, serpentine roads were created. When the regiment marched under the Magyaros Peak at the beginning of March it snowed heavily, so the weather was also favorable, and on March 3, the regiment occupied their starting positions with the beneficial cover of the snowfall. [11]

The occupation of the Magyaros Peak was successful, in which not only the courage and determination of the soldiers played a role, but also the targeted preparation, where they were prepared for a well-known and well-defined terrain of a specific attack, precisely exploring enemy positions, which together led to success.

2 THE SCIENCE OF MILITARY GEOGRAPHY AND MILITARY ART

In addition to field research and the processing of empirical experiences, the emergence of military geography as a science has taken a decisive turn in the geographical support of combat activities.

The forming of independent military geography in Hungary can be associated to the name of János Korponay[2]. [12] He was the first Hungarian scientist whose main issue in his military geography theory was not only a general connection between the natural environment and war, but also the relationship between armed struggle and its specific scenes, such as geographical area and battlefields. [13] In the end of 1845 his book "Hadi földírás" *("Military Geography")* which takes a significant place in the history of military culture and the Hungarian military literature, was published. [14] As he says, "Regular combat research of the scene of the battle, and knowledge of the material forces that facilitate or aggravate the battle, can be called Military Geography". [15] He is no longer talking exclusively about the study of terrain and natural geography, but about all social phenomena that can influence combat activity in any direction. In the following, I present an example where the outcome of the battle ended up in significant changes in the field of military geography, and also has led to the expansion of the cartographic toolbox and meant change in attitude.

2.1 1794, BATTLE OF FLEURUS

The first usable aircraft was not even built when the idea of its military application had already arisen. There are legends about an ancient landlord who was the first to use an airborne attack for warfare. During the siege of a city deemed impregnable, he held the pigeons of the city together, tied incendiary material to them, and released them into their nests, thus covering the city in flames. [16] Although this is part of a series of myths, it is a fact that the Army of the First French Republic used a tied reconnaissance balloon[3] at the Battle of Fleurus on June 26, 1794, to observe the positions of the enemy and continuously inform General of Division Jean-Baptiste Jourdan about Austrian movements. This can be called the prehistory of reconnaissance, based on which aerial photography, later used in reconnaissance and shaping an image of the terrain, was developed. The map is a top view image, a representation of reality of a given time, but so far nor have the cartographers nor the users not had the opportunity to view the landscape as shown in the drawing. In addition to the observation of the terrain, the possibility of capturing and later processing and analyzing the image fundamentally changed the profession – this led to mapping based on aerial photography and satellite imaging. Also as a result of this new warfare, the French troops won over the Austrian army, victory secured the borders of the French Republic, and Austria was forced to evacuate the Netherlands, which was occupied by French troops.

3 WEATHER AS A BATTLE AFFECTING FACTOR

With the development of military technology, the battlefield also expanded. Exploring the terrain has become a strategic task. Precise, fast combat maneuvers required much more accurate descriptions with more data than before. As a result of technical progress, the spread of longer-distance shipping, which has become safer, has expanded existing land-based knowledge by understanding the sea conditions.

From the end of the Middle Ages, the terrain included not only the land and the smaller, navigable seas, but also the entire Earth, the oceans. The survey became larger in scale, the given terrain conditions were depicted more and more accurately in the maps and descriptions. Military geography as a science integrated the military aspect of meteorology, and by the 21st century the two areas had

[2] 1819–1881. Military officer, military science writer, correspondent member of the Hungarian Academy of Sciences.
[3] It was called l' Entreprenant, which means Enterprising.

merged as geospatial information. Nowadays military geospatial information includes, but is not limited to, facts about the earth and its atmosphere referenced by geographic position and arranged in a coherent structure. This includes, but is not limited to aeronautics, biology, cartography, climatology, ecology, ethnology, geodesy, geography, geoinformatics, geology, geophysics, geopolitics, hydro acoustics, hydrography, hydrology, meteorology, oceanography, photogrammetry, remote sensing and space weather.

From the beginning to the modern age, the science of meteorology developed mainly empirically, as did military geography. The Age of Discovery, or the Age of Exploration (approximately from the beginning of the 15th century until the middle of the 17th century) the sailing people gained extensive experience of the movement of the winds, the changes in the weather. Technical changes also accelerated the development of the science of meteorology in the 19th century, with military reasons and goals also playing a role. A new element has entered the history of meteorology at this time, aviation, which is even more dependent on atmospheric changes than shipping. A milestone in the history of the development of weather forecasts is the emergence of aviation, which has meant not only another area of use for meteorologists, but also a completely new opportunity to learn more about the atmosphere. In order to ensure the effectiveness of planning and launching military operations, it has become unavoidable to analyze and take into account meteorological forecasts, for example meteorologists of the Allies also played a key role in preparing for perhaps the most defining battle of World War II, the D-Day, the Normandy landings. [17]

Historical examples show that ignoring the rapidly changing meteorological conditions can result in severe defeat. Or it is precisely the foreseeable, recognized weather conditions that can give an advantage in military activity In the following, I present events that induced the birth of weather forecasting, its military application during military operations, and then the strategic significance and integration of medium- and long-term forecasting into military planning.

3.1 1854, BALAKLAVA BAY

In November 1854, in the early stages of the Crimean War, two meteorological events occurred that had a significant impact. The first was a strong fog on the 5th, which helped both sides hide the start of the attack from the allies until they were close to the British, and helped the British maintain their fighting morale as the they could not assess the true size of the Russian force. [18] The other was a huge storm.

On the night of November 14, 1854, the united Anglo-French navy was destroyed in a few hours in the Bay of Balaklava. The destruction was not carried out by Russian warships, but by a powerful storm that decided the fate of the Battle of the Black Sea. According to contemporary reports the storm was level 11 on the Beaufort scale, and the wind speed reached 103-120 km/h. [19] The loss prompted the French Secretary of Defense to ask Urbain Le Verrier, the great French astronomer, to launch an investigation to see if the approach of the storm could have been predicted and the Navy could have been warned in time. The astronomer's answer was yes. This study has resulted in a significant leap in the development of the synoptic weather reporting network, this therefore led to the spread of weather forecasting. Pál Hoitsy wrote a study on this in the Hungarian Journal of Natural Sciences in 1879 entitled "Meteorology as Weather Forecasting". [20]

3.2 1588, DEFEAT OF THE SPANISH ARMADA

King Philip II of Spain planned the invasion of England in 1588. He wanted to paralyze the English, who supported the Dutch uprisings, with a strong naval attack and invasion, and in the long run, of course, he would have demanded the English crown as well, thus increasing his naval power. The Spanish fleet, the Great Armada, set sail for the Channel in late May. The war plan consisted of two parts: the fleet would have collided with English ships upon arrival, while ensuring that the Duke of Parma's army in the Netherlands crossed the Thames estuary, launching a surprise land attack against the English.

With the departure at the end of May, the Spaniards wanted to launch a quick, sudden attack, but due to the weather and bad wind conditions, the fleet was still stationed in Spain for a month. By the time the Spanish ships reached the Channel, they had missed the opportunity for a sudden attack, owing to enemy reconnaissance. The A were anchored in the port of Plymouth until the arrival of the Armada. The Armada took up their formation, only then did the English line up. Taking advantage of the west wind prevailing in the canal, they lined up behind the arriving Spaniards. On July 31, the naval battle broke out, which lasted until August 4, then due to the lack of reserves – ammunition, food – the battles ceased, and the two fleets had to take reserves and repair ships. The Spaniards were still in a good position at the time, their losses were not severe, but crossing the Channel had not yet been secured. In the meantime, King Philip II's allied armies anchored in the blockade of Flemish ports, their departure was unsafe. The blockade could have been broken by Armada ships, but due to the shallowness of the sea in front of Dutch ports, deep-water Spanish ships would not have been able to enter the ports, so the Duke of Parma's army would have had to cross the blockade unprotected until they reached the deeper waters provided. The two sides, the Duke of Parma and the leader of the Spanish fleet, the Prince of Medina Sidonia, were waiting for each other, the Parma in the ports, the fleet in front of Calais; the latter being attacked and shattered by the English on 7 August. The Spaniards were still able to resist the English attacks for the next two days, but decided to return home without the possibility of mooring and thus replenishment. Considering the prevailing winds and the estimated strength of the English fleet, they decided to bypass the British Isles, a decision that finally paralyzed the Spanish fleet, which was thought to be unbeatable. [21]

Here, on the one hand, the rare North Atlantic atmosphere, especially rich in cyclones and anticyclones, which can be traced back to even a small ice age, was decisive, resulted in that the Spanish Navy slipped the opportunity of taking a surprise. [22] On the other hand, due to the shallow water and wind conditions of the the Channel, the complexity of the return journey led to an avoidable loss. The defeat of the Spanish Armada certified the English strategy and caused a revolution in naval tactics, taking advantage of the wind, the weather gauge, and line-to-line cannon fire from windward, but the latter may be the subject of another study.

3.3 ON FOOT ON FROZEN WATER – COLD WINTER OF 1657–58

There are examples in military history for land maneuvers that were performed on terrain which otherwise could not have be considered as land. Here we see an example of recognizing the extreme opportunities provided by the weather.

In the summer of 1657, Denmark launched hostile actions against Sweden. Charles X Gustav, King of Sweden, who was at war in Poland at the time, marched at high speed to his army in the western part of Denmark, Jutland. The conquest of the peninsula was completed in November 1657, but in the absence of a proper navy, Charles X was unable to continue his campaign in the direction of Copenhagen, the capital of Denmark in the island of Zealand. Unexpectedly, the extreme winter of 1657–58 helped them. In February 1658, the Little Belt strait, which separates Jutland from the island of Funen, and the Great Belt strait, which separates Funen from Zealand, were completely frozen, at a depth that provided adequate security for the Swedish army to pass through the frozen sea areas from Jutland to Zealand, and to force the Danes to sheathe the sword. [23]

4 TERRAIN AND WEATHER TOGETHER – 1945, NORMANDY

Normandy landings was one of the most significant military operations of World War II, with terrain and weather playing a major role, if you like, the first modern operation designed deliberately based on geospatial information, although at the time this term was apparently not used.

The situation on the European battlefield has made it increasingly necessary to open up the Western European front, which could weaken Germany's eastward expansion. Thus, in 1943, the Allied set out to plan a large-scale European invasion. In the first part of preparing the plans, the task was to select the most suitable location. Important criteria were that the landing site be relatively close to Britain so that landing troops could receive adequate air support, and that rapid, smaller replenishment was

provided in this way. The designated stretch of coastline should have had a larger port to be occupied. After that, a larger supply of seafarers would have been possible.

The most important condition for success was the right terrain conditions. The invasion required a relatively flat site with few field obstacles. The coasts of Belgium and the Netherlands would have met this criterion, but the Germans had well-established protection in these areas, and much of it was protected by dam systems, which were also advantage for them. Potential sites were thus limited to the coasts of France. After examining the northern French coasts, the choice fell on the coastline of Calvados, Normandy. The area has an open, flat, sandy beach, the coastline is sloping and relatively easy to walk. The area is covered by a well-developed network of routes, and the nearby port of Caen was perfectly suited to the supply of sea supplies. [24]

In addition to the field analysis of the area, the measurements of meteorologists also provided important data. The invasion was intended to be carried out as soon as possible, but the weather in the canal could have had a significant effect on the supply and cover fire, so the action had to be carried out under clear weather conditions. According to observations, this date falls in the early summer period, June. [25] The time of day was chosen according to the needs of the infantry, the units landed at dawn. Therefore, it was important that the dawn light conditions at the chosen time were also favorable, as the transport vehicles could not use their own lights. Comparing meteorological and astronomical measurements with the tidal calendar, it turned out that the fifth of June could be one of the ideal times. The landing date finally became the sixth of June, as a storm raged over the canal on the fifth, resulting in the invasion being postponed by 24 hours.

Everything was ready for a successful operation. In spite of thousands of casualties, Allied successfully carried out the landing called Operation Overlord, which had a decisive impact on World War II. The coordinated work of military geography and meteorological knowledge has apparently brought results, thanks to well-developed strategic plans, accurate measurements, and physical and chemical analysis of the terrain.

5 WARFARE WITHOUT OBSTACLES OF PHYSICAL SPACE

With the advent of twentieth-century aeronautics, the terrain that previously functioned as a flat battlefield has now been expanded with air, above-ground space. The development of missile technology and the launch of satellites into orbit have elevated terrain knowledge and the entire warfare above previous terrain survey methods. The currently used measurement systems and the coordinated study of the earth sciences give the most accurate picture possible of the various field conditions. With the help of modern tools, the knowledge and information obtained from specific locations can be updated from hour to hour in the digital databases, which keep the army constantly up to date on the battlefield. The terminology also has been changed – as geographical features became geospatial features, battlefield became battlespace.

Today, the former study factors of military geography, the relationship between wars, armed activities and geographic space, have been replaced by a complex study of security factors. The range of factors expanded, elements such as migration, economic threat, climate change, lack of water resources, and ethnic-religious conflicts emerged. These are also within the scope of military geography and/or geospatial analyses, as each of the mentioned risk factors can be linked to a specific environmental territory and each of them have their geographical outcomes. [26] Although the geographical and territorial relevance of these factors is unquestionable, in parallel, tools have emerged in warfare that is not set back by the terrain in the classical sense.

5.1 CYBER WARFARE

According to a 2006 study, there are many aspects to the "space" of cyberspace. [27] According to this, cyberspace is capable of creating worlds that may seem like a continuation of geographic space or outer space, but in these the physical laws of space-time make little sense. The reason for this is that space in cyberspace is purely relative, in both a physical and social science sense. Cyberspace consists of many artificially created spaces that take on a feature similar to geographic space only if

they have been specifically programmed for it. Cyberspace has intangible and dynamic spatial and structural forms; they do not form an obstacle in the physical sense of the word. It does not influence the outcome of the battle like the terrain, the weather, or other physical military geographical factors but may be included in the geospatial analysis of an area with a geographical projection. This is because a cyber-attack can pose a threat to a country's critical infrastructure. By using computer networks alone, without conventional warfare, attackers can cause significant damage to the attacked country. [28]

5.2 2007, RUSSIAN CYBERATTACKS ON ESTONIA

It is not possible to bring up a specific battle for the above cyber warfare, in this manner cyber-attack can be considered terrorist attack, but one good example is the 2007 Russian–Estonian cyber war. While this was not the first recorded cyber-attack – NATO was the first to face the means of cyber warfare during the 1999 bombing of Kosovo, when Serbian hackers attacked NATO websites and its website became inaccessible on several occasions for a long time – it was the first where an entire country was successfully attacked in this way.

The attacks started on April 27 and lasted until mid-May with different intensities, during which banks and public institutions were hit by digital attacks. The attackers aimed to paralyze the country's economic and telecommunications network, causing disruptions in the online money transfer system and the continuity of web commerce, making websites of public institutions largely inaccessible, and crashing key servers controlling online traffic on a daily basis. As a result, many public institutions had to be temporarily disconnected from the network. They managed to do so without conventional warfare, no weapons were shot and no geographical obstacles had to be overcome. [29]

5.3 HYBRID WARFARE

The hybrid warfare model is the latest product in 21st century warfare theory with contradictory approaches. What Western analysts identify as hybrid warfare is called a strategic deterrent in the Russian literature. In the description of fourth-generation warfare, we find features such as asymmetric warfare, which has since become a separate category of warfare, and the important fact that the line between peace and war is blurred, and that there is no recognizable, well delimited battlefield, no proclamation of war.

5.3.1 2014, RUSSIA – UKRAINE CONFLICT

NATO and Russia accuse each other of the practical application of hybrid warfare. Russia is conducting hybrid warfare against Ukraine; according to Russia, the U.S. carried out this type of operation against the countries of the so-called "Arab Spring". In 2015, NATO defined such threats as hybrid warfare. [30] Hybrid warfare can be interpreted as a very complex model system. During the conflict in Ukraine, the Russians engaged in full-spectrum hybrid warfare. Hybrid warfare should not be confused with the use of some of its components, because in the latter case, it lacks the very essence: the strategic nature of the hybrid model. From the definitions and the hybrid-type operations carried out so far, their scheme and methodology are outlined in general: the "attacking party" deploys its forces to exert pressure to deter the opposing party from deploying its own armed forces to restore order. Opposition groups then take action against law enforcement forces with the strong support of the attacking party, and in a favorable case, the overthrow of power can take place already at this stage, without open military operations. [31] It is also very similar to terrorist attacks.

Importantly, the combination of irregular and conventional warfare in Ukraine was realized by a state actor, Russia, which officially still denies involvement in the conflict in eastern Ukraine. Russia planned and coordinated military operations against Ukraine, which were largely carried out by proxy actors and others by the Russian army itself. The terrain, the interpretation of geographical conditions, the weather in such a case is secondary, if at all. In preparation for a hybrid war, the socio-geographical segment of geospatial information comes to the fore, the analysis of religion, ethnic composition and economic–social conditions.

5.4 SPACE FORCE, REMOTE CONTROLLED WARFARE

It is essential that a very special interpretation of the operational space is required in the case of space warfare. In 2020, the U.S. established the U.S. Space Force as a service branch, the first new service branch within the U.S. Army since the creation of Air Force in 1947. It is also necessary to redefine the concept of geospatial information, in addition to transforming doctrines, to integrate the field of space force operations into the study of military geography, meteorology, or geospatial information.

In the same way, the actions carried out by UAVs (Unmanned Aerial Vehicles) or RPVs (Remotely Piloted [Aerial] Vehicles), the remotely piloted aircraft, commonly known as drones, should be specifically examined. As air navigation is concerned, meteorology plays an important role in this case as well, but the terrain is almost completely neglected as an obstacle. A good example of this is the killing of Iranian Major General Qasem Soleimani, commander of the Quds Force, a special unit in the Islamic Revolutionary Guard Corps (IRGC), who was the victim of an American drone attack in Baghdad in January 2020.

CONCLUSION

The range of military geographic factors expanded as military science evolved. In the early days, from antiquity to the Middle Ages, knowing the terrain was sufficient to successfully fight battles. In times, owing to the development of technologies and military science, in addition to the study of physical geography, the study of human geography has also become part of the discipline. The definition is still evolving today, and in the early 2000s, military cartography, military geography and meteorology merged in accordance with NATO terminology, creating the concept of geospatial information in Hungary.

Conflicts of asymmetric engagement, hybrid and guerrilla warfare require a different kind of spatial analysis. The relationship between space and armed struggle can no longer be identified with the definitions of geographical space and war; the interpretation of space is changing, and geographical space turns into operational space, battlefield turns into battlespace. Definition of geographical space expands vertically, and the concept of non-physical space must be included in the definition. The study of geographical and physical space will not disappear, only the area to be studied will narrow in the traditional sense, and the influence of military art and space on each other will no longer develop on a linear path.

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